



Android Projects

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- The following proposals must be considered just **hints**.
- All the main functionalities listed must be implemented (**minimal requirements** to have the project accepted).
- We strongly encourage to **expand/customize the proposal based on your creativity**.

- Projects described in the following must be deployed by a single student. Group projects are not allowed.
- Project implementation must be **original and 100% student work** (no code share or reuse).
- Submit the project by email (**iam-projects@cs.unibo.it**) including all code, a technical report, and a short presentation (10-15 slides)

- **Read and follow the instructions about projects submission policies (deadlines, validity, etc) on the course website:**

<http://www.cs.unibo.it/bononi>



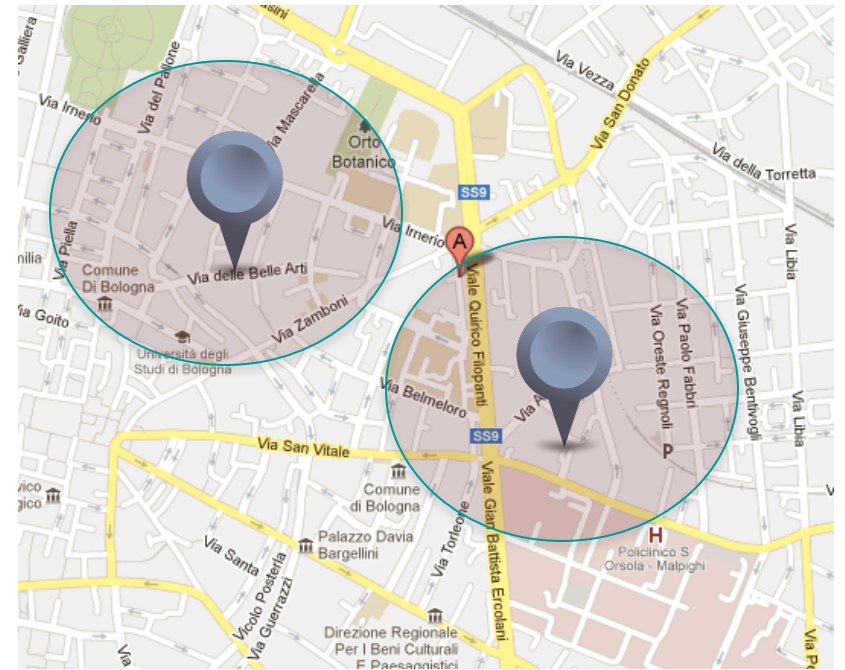
PROPOSAL 1



Android Project Proposals

➤ Implement a Wireless Hot Spot Finder.

- Discover wireless Access Point (AP)
- Save the AP information on a database
- Display AP information on the GoogleMap.





Android Project Proposals

➤ Implement a Wireless Hot Spot Finder.

Functionality 1: **Discover** the AP in the range, and save the information on an internal **database**:

- GPS Coordinates
- Signal Strength
- Security Type (WEP, WPA, Open, etc)
- Network name
- ...



Android Project Proposals

➤ Implement a Wireless Hot Spot Finder.

Functionality 2: Visualize the AP information on the Google Map through **Markers**

- Identify AP through different icons/colors: Secured AP should be displayed in RED, Open AP in Green.
- Foresee different visualization modes (e.g. show all the AP, show only Open AP, show only the AP around me, etc)



Android Project Proposals

➤ Implement a Wireless Hot Spot Finder.

Functionality 3: **Visualize** the areas of Wifi coverage on the Google Map.

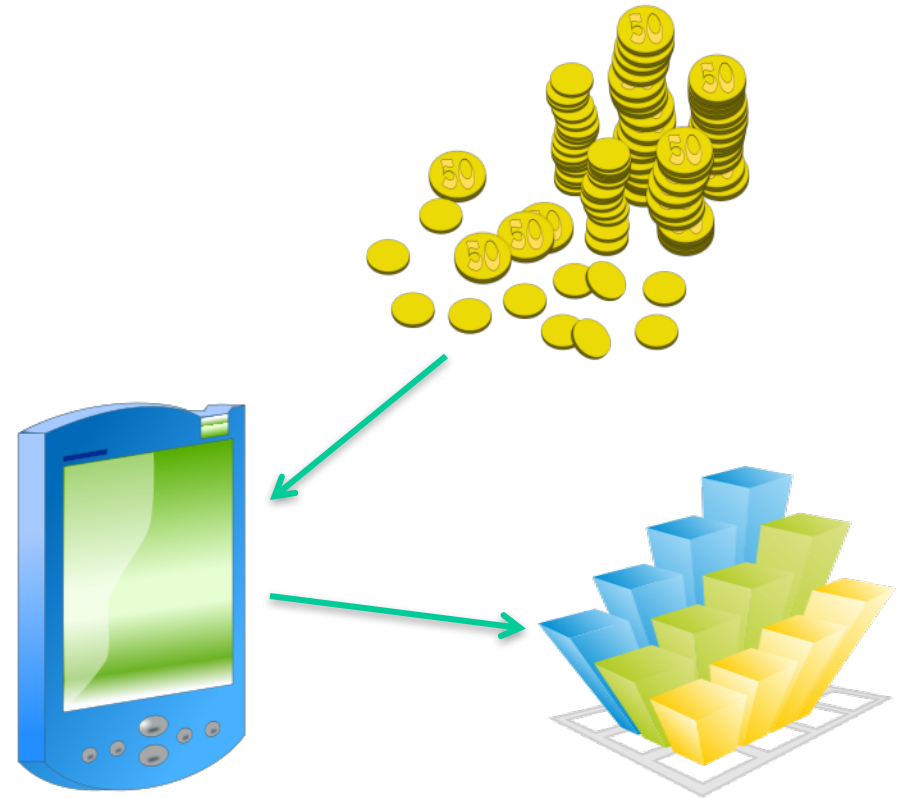
- Color the areas of the GoogleMap where a Wifi coverage might be available.
- Estimate the coverage area of each AP (HOW? Implement an AP localization method).



Android **Project Proposals**

➤ Android **Budget Tracking Application**

- Track **current/periodic expenses**
- **Browse data and generate reports**
- Compute and display **useful statistics** to keep personal finances in order.





Android Project Proposals

➤ Android Budget Tracking Application

Functionality1: Allow tracking of everyday's expenses

- Add information about a current expense (e.g. date, amount, category, description, etc)
- Save all the information on a local database
- Track location (e.g. shop's location)
- **Optional:** Save a picture of the item, acquired through the photcamera



Android Project Proposals

➤ Android Budget Tracking Application

Functionality2: Manage periodic/planned expenses

- Add information about periodic expenses (e.g. loan)
- Add information about planned expenses (e.g. bill)
- Budget must be updated at the payment date
- Periodic reminders should be shown 1 and 2 days before (e.g. through notifications or alert dialogs)



Android Project Proposals

➤ Android Budget Tracking Application

- Functionality3:** Visualize and browse expenses by date
- Visualize and enable browsing the list of expenses day by day, weekly or monthly
 - Allow the creation of **PDF** report (saved locally)
 - Display locations on the Google Maps



Android Project Proposals

➤ Android Budget Tracking Application

Functionality4: Provide weekly and monthly statistics

- Compute and visualize useful statistics about weekly and monthly expenses (e.g. total expenses for each category, budget over weeks, etc).
- Charts can be generated to visualize data.



PROPOSAL 2

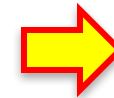


Android **Project Proposals**

➤ Implement a **LaTeX Editor** for Android

- Provide the possibility to **edit** a text file.
- Provide **support** for LaTeX commands/syntax.
- Enable remote **PDF compiling** and file transfer.

L^AT_EX





Android **Project Proposals**

➤ Implement a LaTeX Editor for Android

Functionality 1: Typical **Editor Functionalities**

- Open a text file
- Edit the file
- Save the file
- Close the file
- ..



Android **Project Proposals**

➤ Implement a LaTeX Editor for Android

Functionality 2: Support to **LaTeX** **syntax/commands**

- Highlight the LaTeX commands/symbols (e.g. with colored text).
- Help the user in inserting the LaTeX symbols (e.g. math symbols) on the text.



Android Project Proposals

➤ Implement a LaTeX Editor for Android

Functionality 3: Enable remote PDF compiling.

- The app must transfer the .tex file to a remote server, where a PDF compiler is working.
- Once the PDF is ready, it must be transferred back to the mobile device. An Intent should be generated to open the File.



Android Project Proposals

➤ Implement a LaTeX Editor for Android

Functionality 3: Enable remote PDF compiling.

- (Optional) Manage also the compiler log (e.g. to handle the presence of errors).
- (Optional) Allow the users to insert images to the .tex document. In this case, a .zip archive should be produced and sent to the remote server.

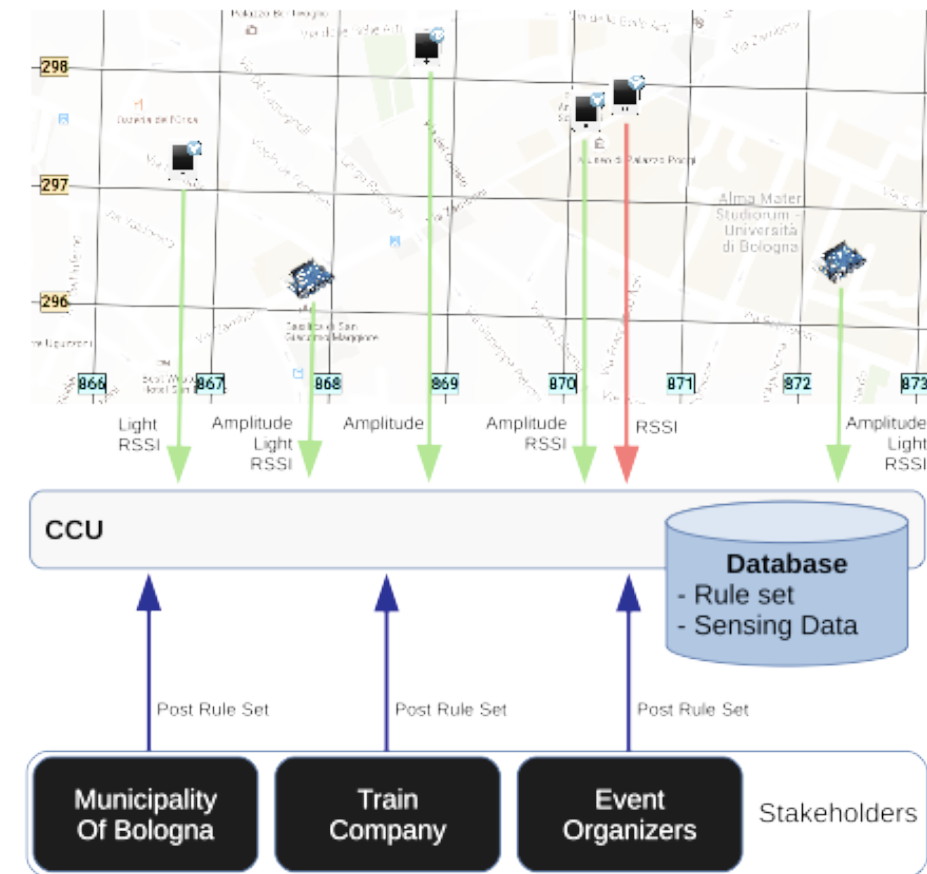


PROPOSAL 3

Mobile Crowdsensing Participant

In Mobile Crowdsensing, users participating in a campaign install an application running in background that collects sensor and network data and send it to a central server.

- A high number of participants means a high coverage.
- Policies reducing redundancy are needed





Functionality 1: Sense the environment and send the data

- Discover the sensors available in your smartphone.
- Discover the network interfaces and turn them on (WiFi, cellular).
- Run the app in background
- Sense the environment and send data in JSON.
- Calculate wireless performances and send data in JSON.
- Use CoAP as the communication protocol.



Functionality 2: Stick to the rules

- The server will send back a configuration containing a spatial and a temporal boundary.
- Manage to send the next update when the timer expires OR when you drop out the defined zone.
- Use geofencing to be notified when you are no longer inside the zone.



Functionality 3: Subscribe to stakeholders

- Stakeholders may provide optional rules (which you cannot see) and may give stronger constraints.
- Provide a list of the stakeholders through the ad-hoc call.
- Subscribe to one or more of their campaigns through the ad-hoc call.



Android Project Proposals

➤ Crowdsense Application

- Give a list of available sensors and configure which should be used
- Send periodically data to a webservice
- Show statistics directly on the phone





Android Project Proposals

➤ Crowdsense Application

Functionality 1. Give a list of available sensors and configure which should be used

- These include accelerometer, gyroscope, sound level etc.
- Add the option to track cellular and WiFi performance
- Users should be able to select which sensor she/he wants to use and report to the webservice



Android Project Proposals

➤ Crowdsense Application

Functionality 2. Send periodically data to a webservice

- You can implement your own webservice, or use services like ThingSpeak
- The app should run at boot and report data in the background, with no human intervention
- The user should be able to configure the time between sensor readings
- The user should be able to configure whether to upload only when using WIFI or not



Android Project Proposals

➤ Crowdsense Application

Functionality 3. Show statistics directly on the phone

- Show statistics and charts about the last day/week/month regarding reported data
- Do not store values on the phone, download them from the webservice



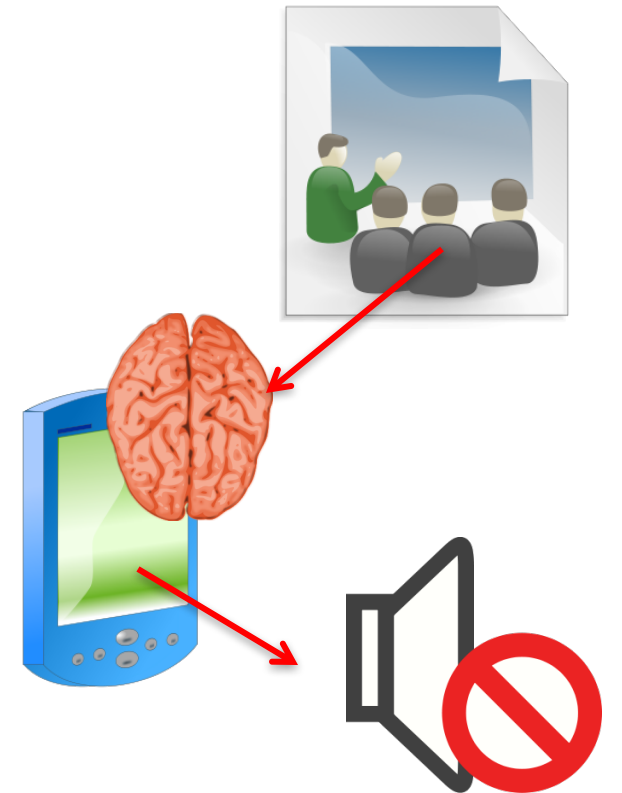
PROPOSAL 4



Android Project Proposals

➤ Sensor Recording

- Start at the system boot
- Configured by the user
- Recording
- Notification





Android **Project Proposals**

➤ Sensor Recording

Functionality 1: Start at the system boot

- The application has to start at the system boot
- Check also, from time to time, whether the application is still running. If not, start it



Android Project Proposals

➤ Sensor Recording

Functionality 2: Configuration

- The user should be able to configure:
 - The sensors she/he wants to record
 - The frequency at which she/he wants to record
 - Putting 0 will disable the previous step



Android Project Proposals

➤ Sensor Recording

Functionality 3: Record

- The application should run in the background
- Data has to be saved, according to the frequency, in a csv file as follows
 - `TIMESTAMP,S1-V1, S1-V2, ... , SN-VN, LABEL`
 - Be careful! Not all the sensor will give a measurement in the same time unit
- Possible plus: sharing



Android Project Proposals

➤ Sensor Recording

Functionality 4: Notify the user

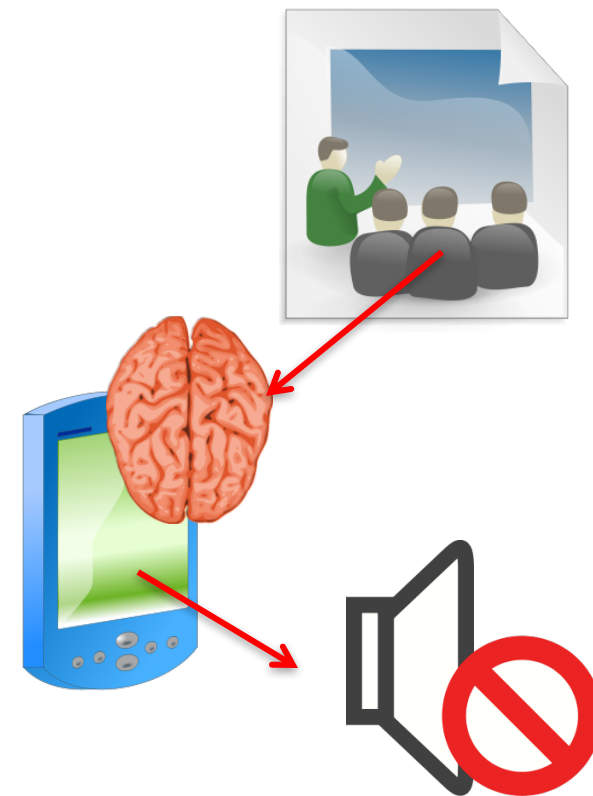
- From time to time, the application should send a notification to the user
 - Asking what she/he is doing at the moment from a list of pre-defined actions
- When the user selects the action, it has to be recorded in the LABEL row of the measurement



Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

- **Recognize** a set of pre-defined contexts.
- **Capture** a set of pre-defined events.
- **Define** a list of possible actions.
- Allow the creation of rules:
<Context,Event> → Action





Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

Functionality 1: Recognize a set of contexts

- Allow user's defying context name (e.g. meeting) and characteristics.
- Basic characteristics:
 - ✧ Temporal information (e.g. date/time)
 - ✧ Spatial information (e.g. GPS location)
 - ✧ Mobility information (e.g. GPS speed, acceleration, etc)



Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

Functionality 1: Recognize a set of contexts

- Allow user's defining context name (e.g. meeting) and characteristics.
- Optional (fine-grained) characteristics:
 - ✧ Sensor values and patterns (e.g. accelerometer)
 - ✧ Radio interface state (e.g. WiFi state)
 - ✧ Microphone/videocamera inputs



Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

Functionality 2: Event Recognition

➤ Capture and recognize a list of external events that might occur on the smartphone..

➤ Examples of events:

- ✧ Phone call incoming
- ✧ SMS reception
- ✧ WiFi detected
- ✧



Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

Functionality 3: Provide a list of pre-dened actions and notications that can be executed.

- Three categories of actions:
 - ✧ Modify the smartphone setting (e.g ring tones on/off)
 - ✧ Recall the user's attention through status-bar notifications
 - ✧ Perform operations on social media (e.g. publish a state update on Facebook)



Android **Project Proposals**

➤ Android **IFTTT (If-this-than-that)** Engine

Functionality 4: Allow a user specifying IFTTT rules.

- IFTTT Rule: <Context, Event> → Action
 - ✧ Continuously monitor context/event and perform corresponding action
- Optional elements:
 - Allow combining multiple contexts/events through boolean operators (AND, OR, NOT)
 - Allow multiple actions on the same IFTTT rule